

OHIO'S GEOLOGIC HAZARDS

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“GEOLOGIC HAZARD”

“A naturally occurring or human-made geologic condition or phenomenon that presents a risk or is a potential danger to life and property. Examples include landsliding, flooding, earthquakes, ground subsidence, coastal and beach erosion, faulting, dam leakage and failure, mining disasters, pollution and waste disposal, and seawater intrusion.”

GEOLOGIC HAZARDS RESULT FROM:

MATERIALS - OR - PROCESSES



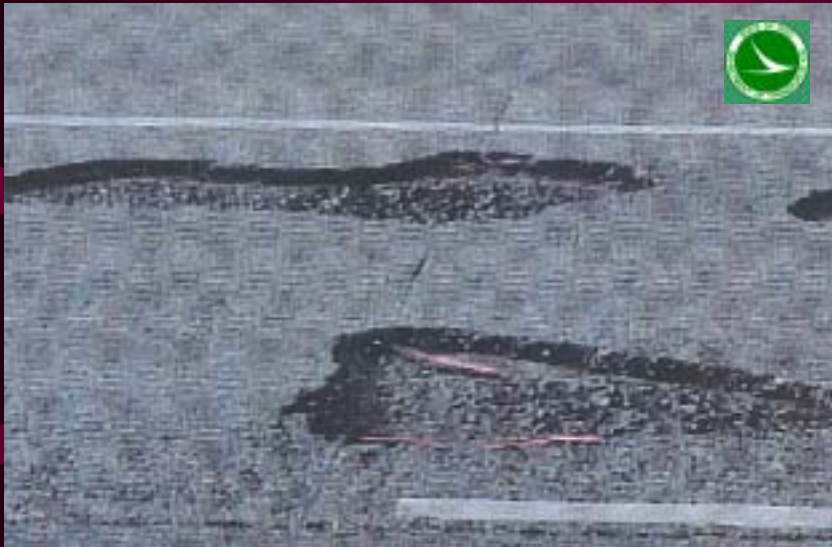
MATERIALS

- Reactive minerals
 - Reactive aggregate particles
 - Pyrite
 - Clay lumps
 - Coal
 - Chert (alkali-silica reactions)
 - Shale particles
 - Limonite concretions
 - Sodium/potassium oxides
 - Organic particles (peat, organic silt/clay)
- Swelling soils (expansive clays)
- Sinking earth (organic deposits – glacial terrain)

MATERIALS, CON'T.

- Polishing of particles (low skid resistance)
 - Dolomite & dolomitic limestone are more durable than relatively pure limestone.
 - Very finely crystalline rock polishes exceedingly well.
 - Expanded shales, and sandstones have very good polish-resistant properties.
 - Chert probably polishes well.

Materials - examples



Reactive minerals causing disintegration of highway.



Swelling soils causing "roller-coaster" highway.

Materials – examples, con't.



Chert

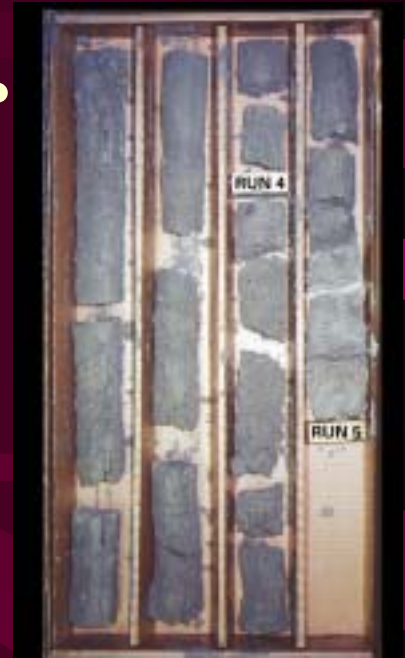


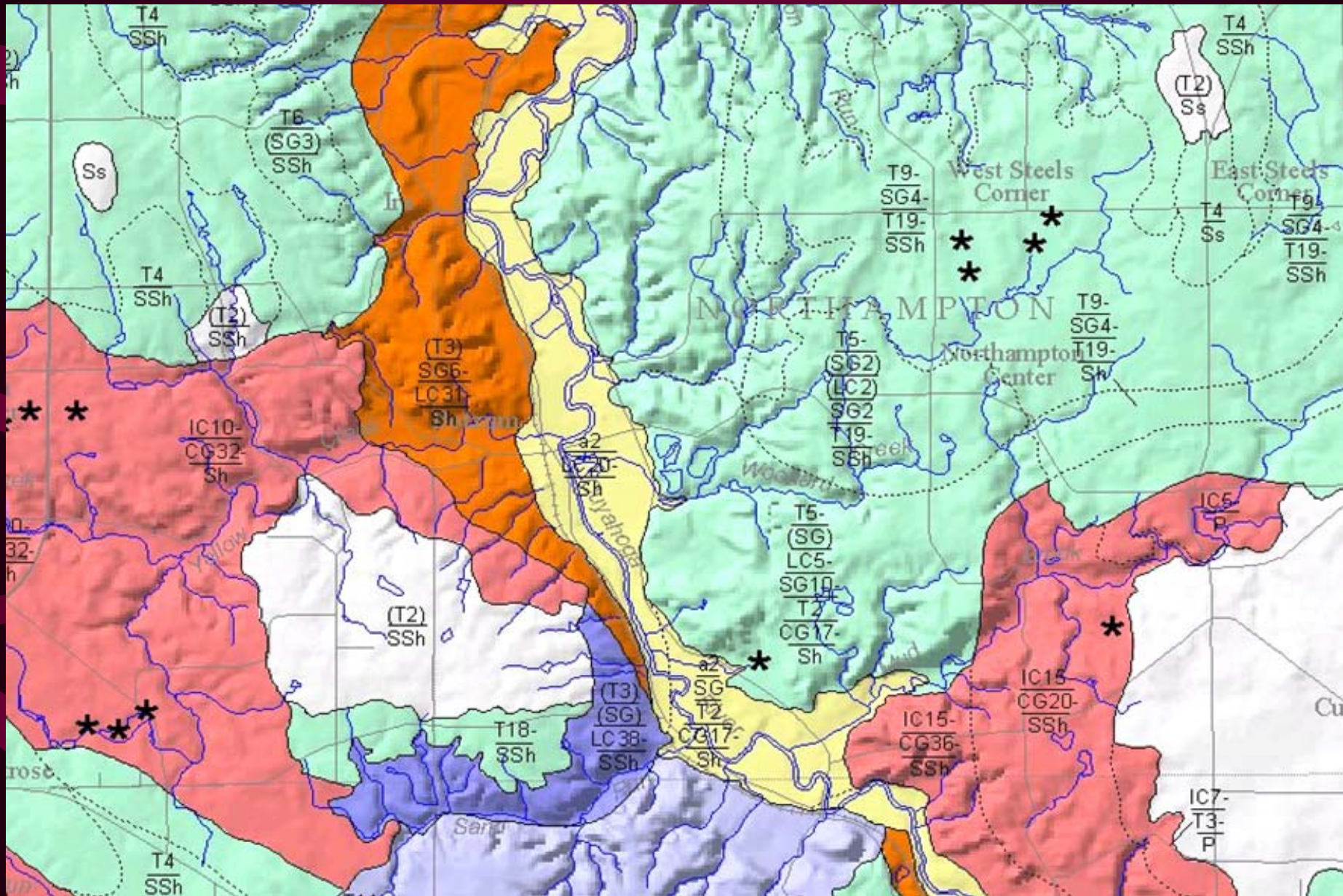
Clay Lumps

Materials – examples, con't.



Sinking Earth
(peat & organic soils)



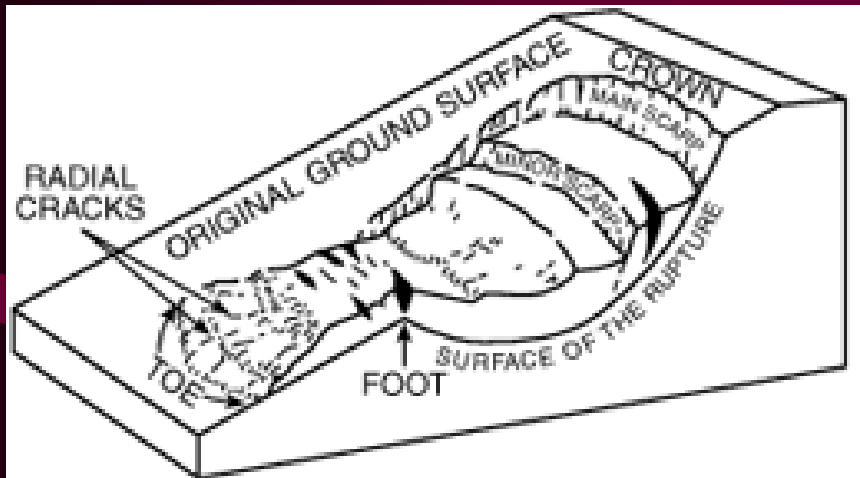


3-D Surficial Materials Mapping (stack-unit mapping)

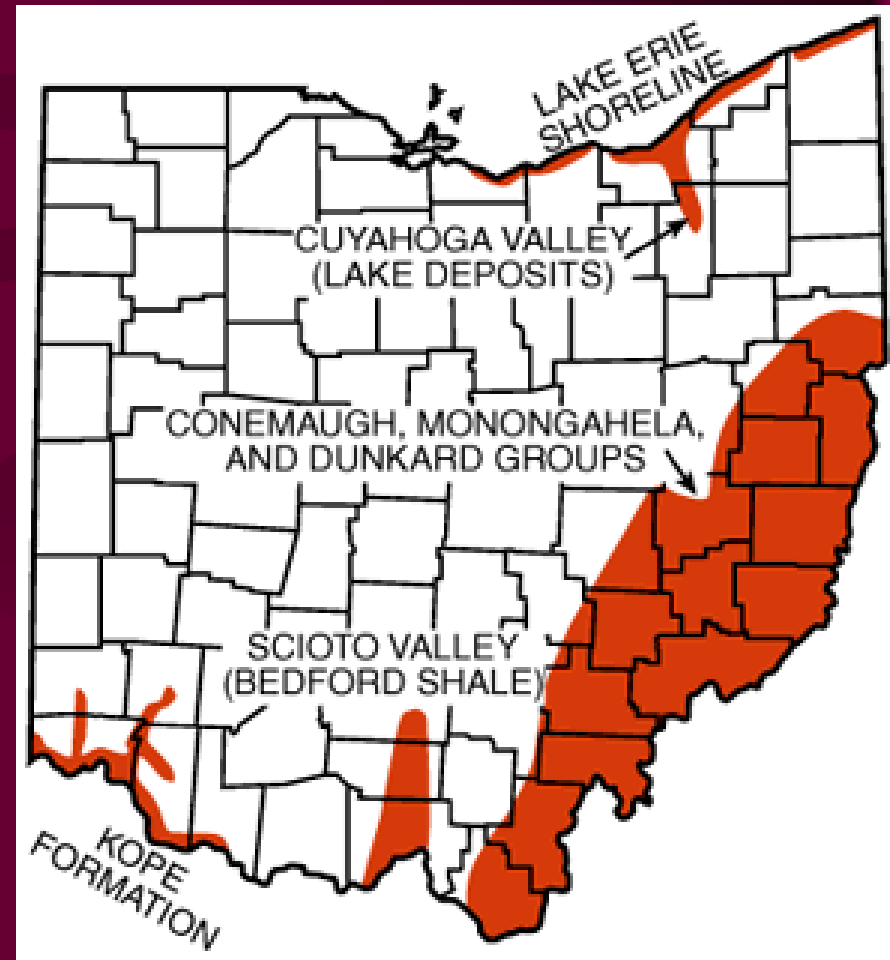
PROCESSES

- **Landslides (including earthflows)**
- **Rockfalls**
- **Debris flows**
- **Mine subsidence & abandoned underground mines**
- **Karst**
- **Paleokarst**
- **Floods**
- **Coastal erosion**
- **Earthquakes**

Landslides



I-70 - New Concord - 1986



Landslides - examples



Cincinnati - 1995



Cincinnati region

Earthflow – Cincinnati area



Earthflow – southern Ohio

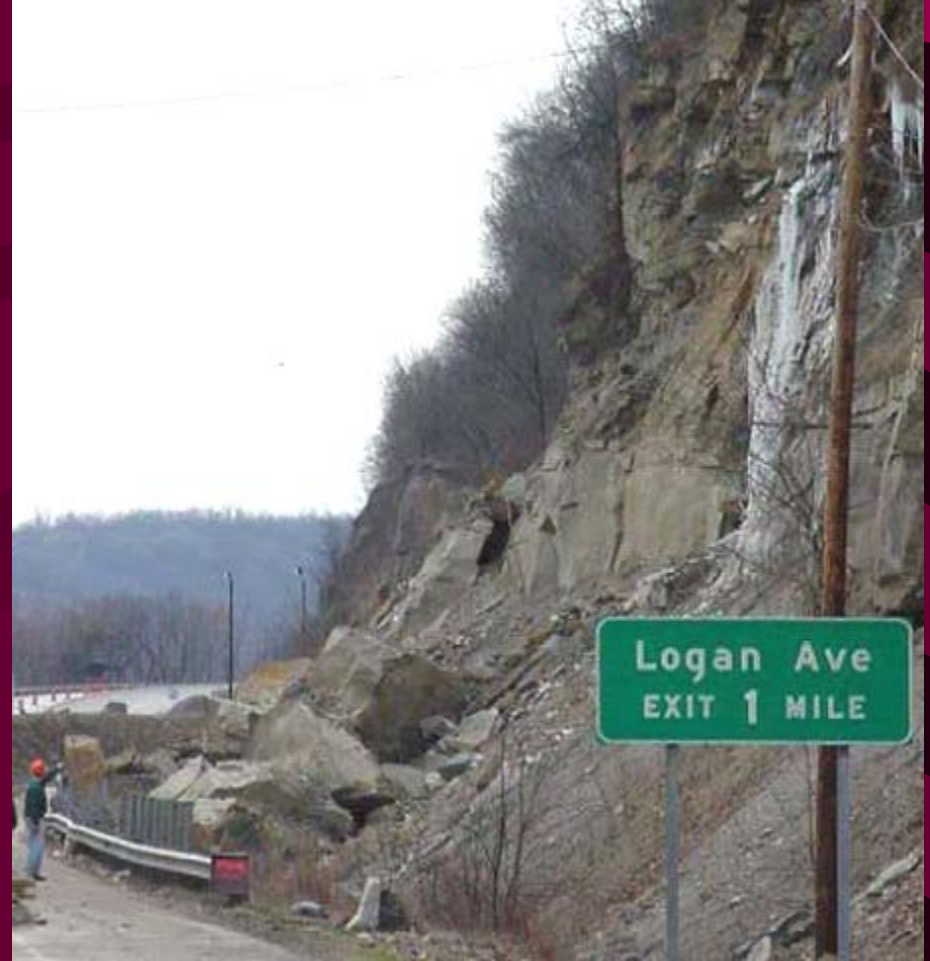


Rockfalls

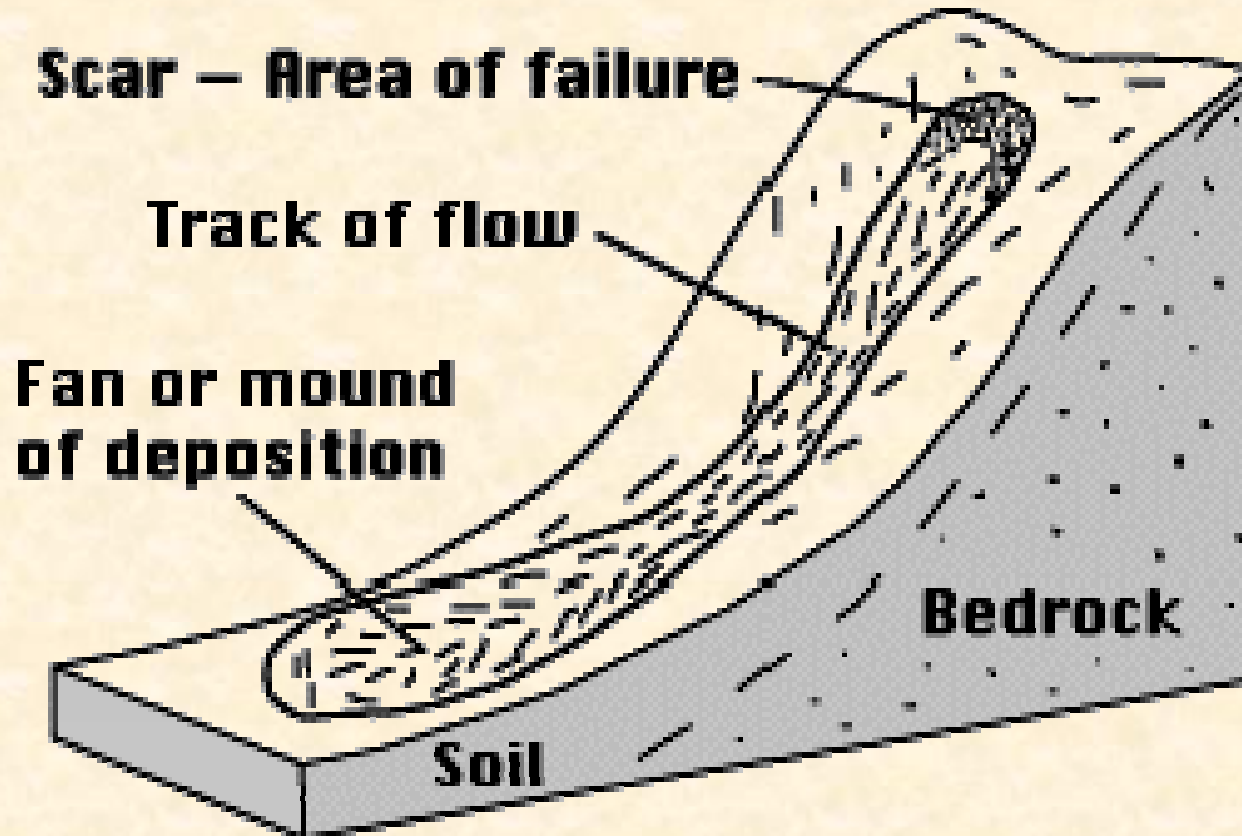


Rockfall at Pomeroy, Ohio

Ohio rockfalls



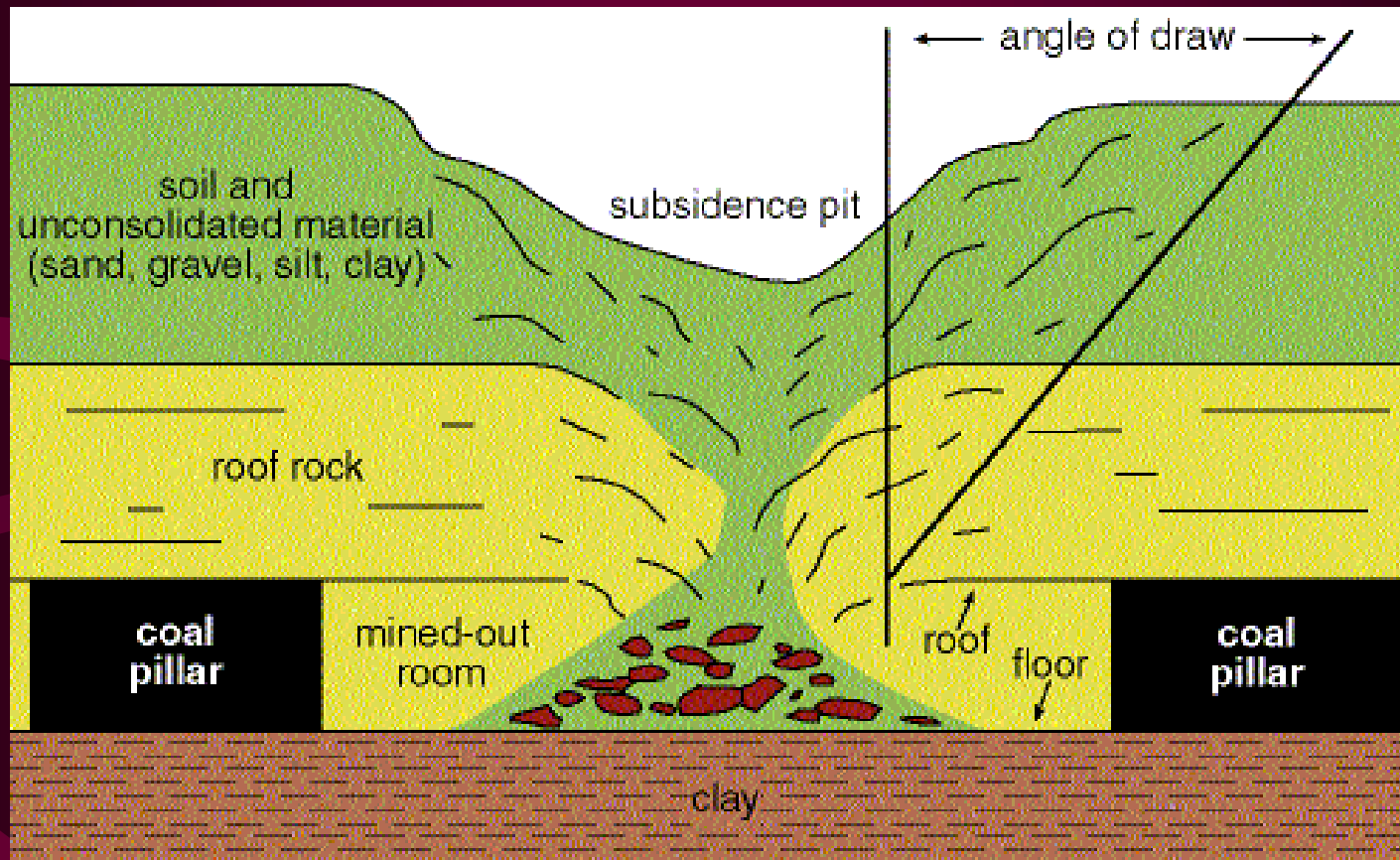
Debris Flows



Mine Subsidence & Abandoned Underground Mines



Mine Subsidence & Abandoned Underground Mines

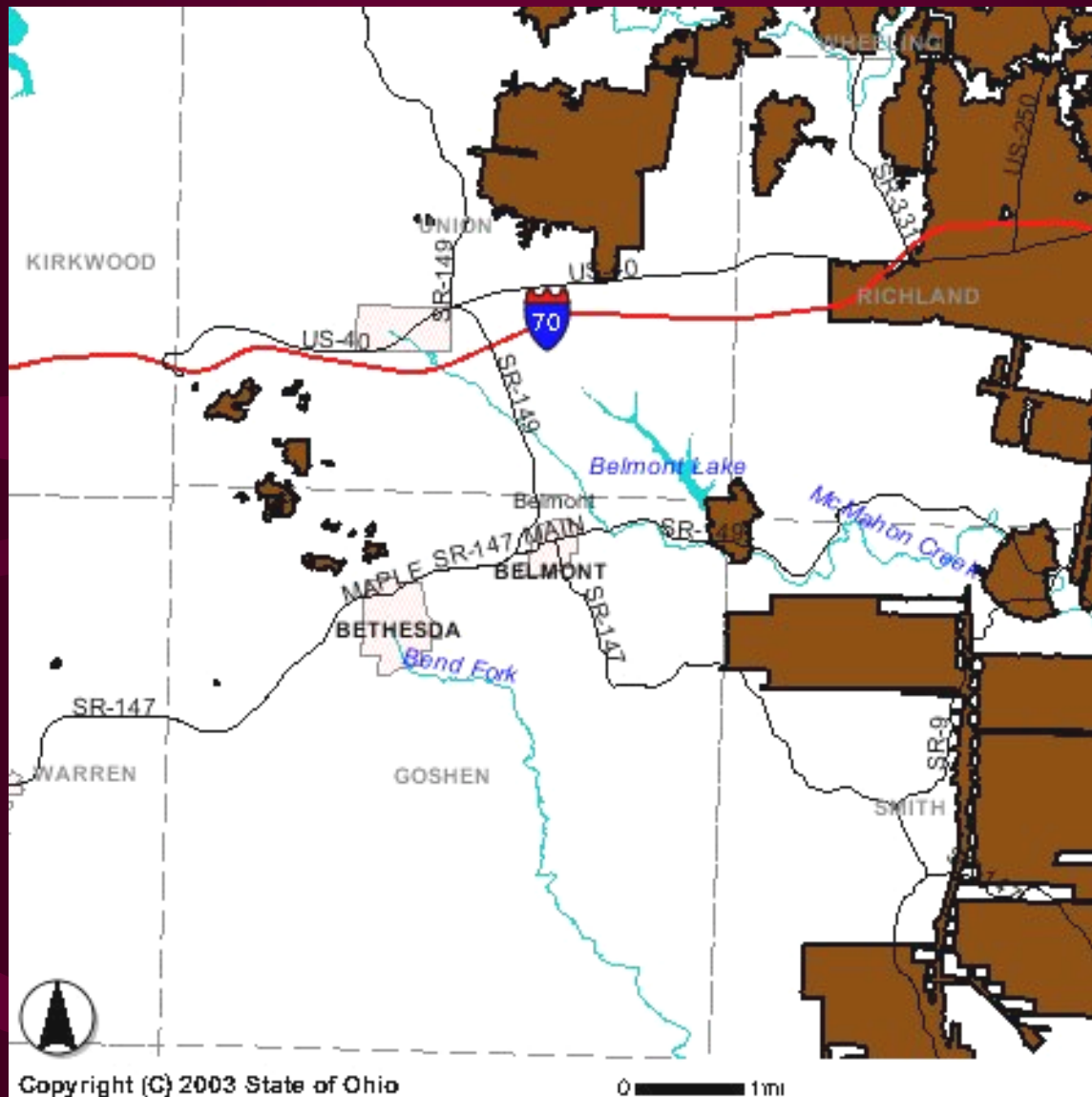


Diagrammatic cross section of typical subsidence resulting from mine-roof collapse. No scale implied.

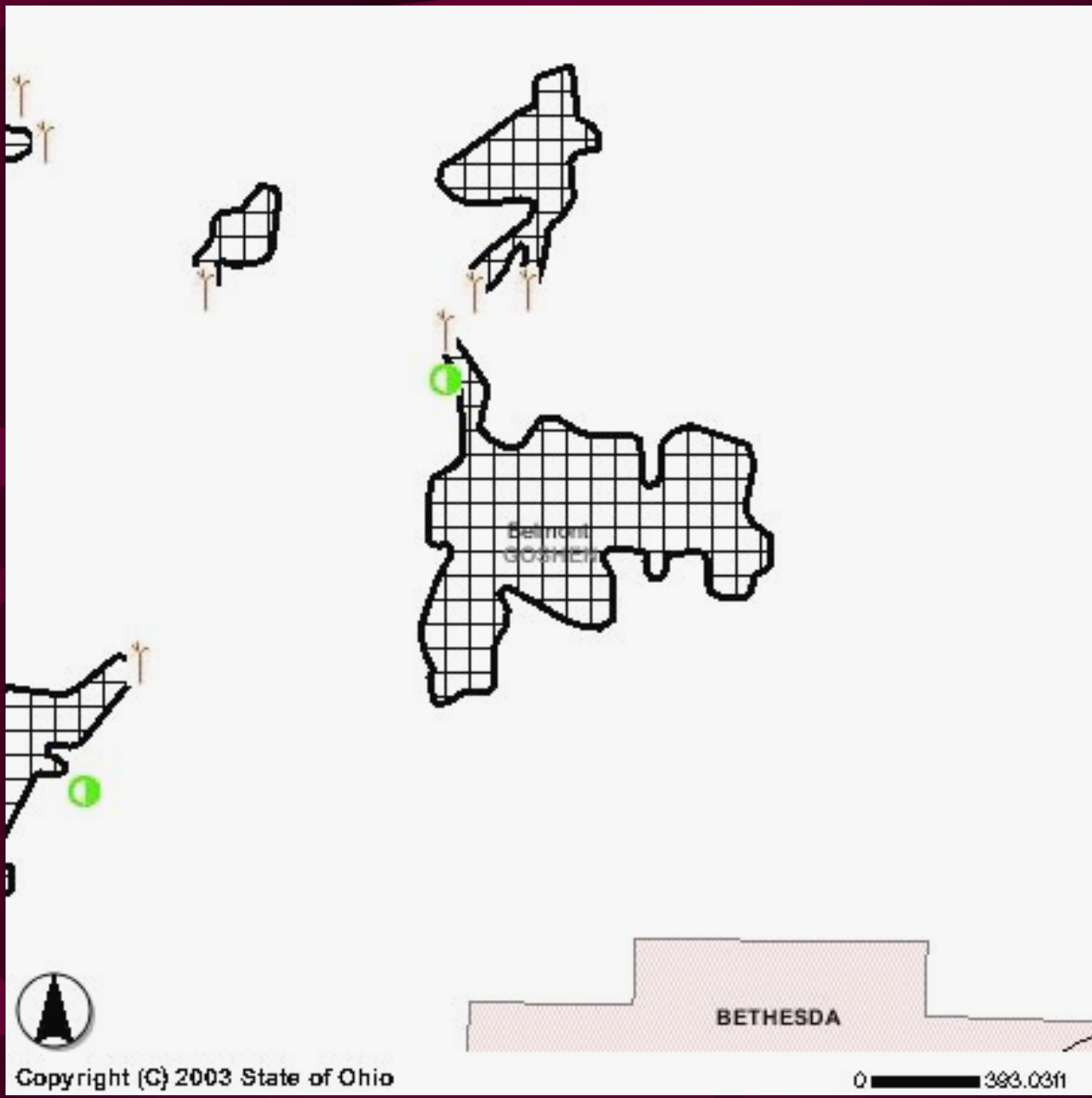
Mine Subsidence & Abandoned Underground Mines



Abandoned Underground Mine Locator



Abandoned Underground Mine Locator, con't.



Abandoned Underground Mine Locator, con't.

Underground Mine Information Form

Mine API # - 340138012502

Old Mine Code - BT-125

Mine Name - GRIFFITH

Commodity - COAL

Mine Type - UNDERGROUND

Formation(s) Name - MEIGS CREEK NO.9

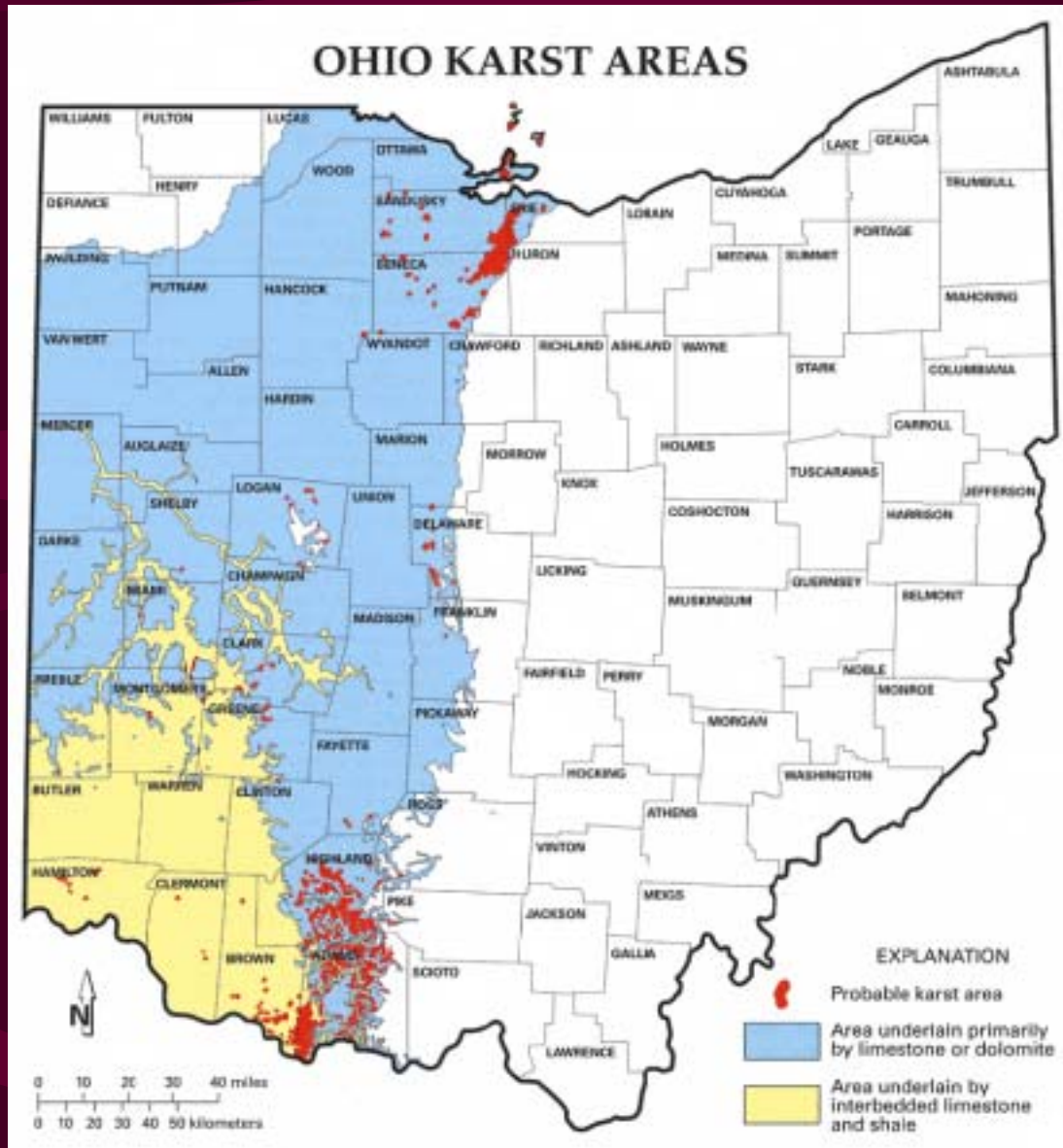
Mine Elevation - 1071

Abandoned Date - 1935

Multiple Mines - 1

Drainage - Above

Karst in Ohio

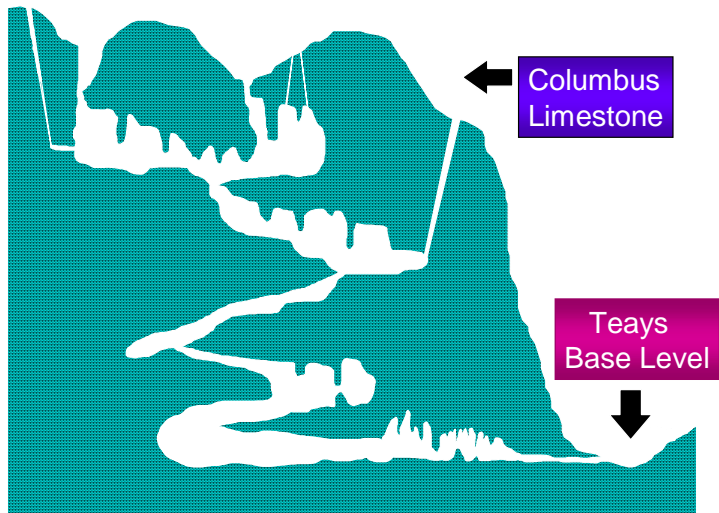


Sinkholes

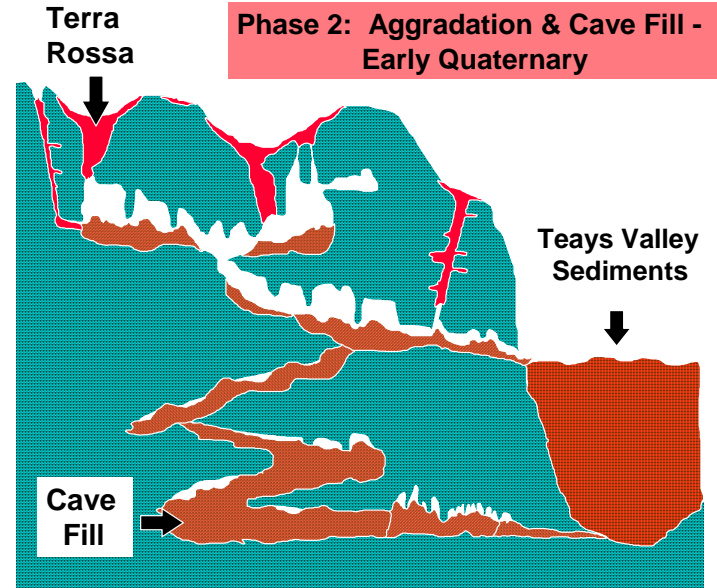


Paleokarst

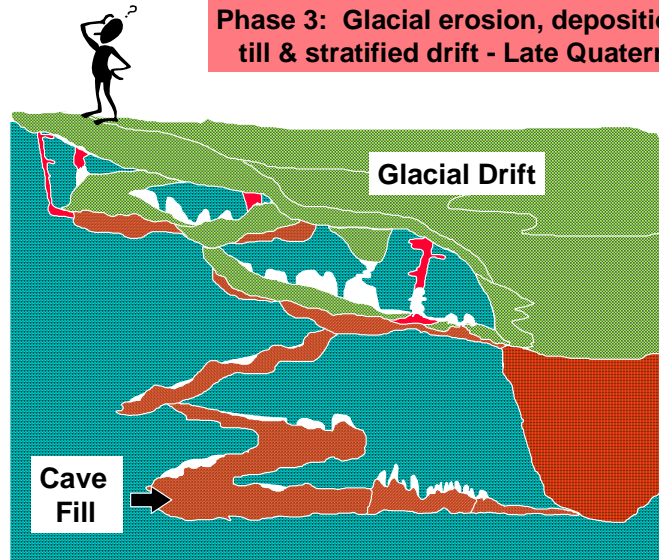
Phase 1: Karstification - Tertiary (?)



Phase 2: Aggradation & Cave Fill - Early Quaternary



Phase 3: Glacial erosion, deposition of till & stratified drift - Late Quaternary



Floods



Controls on flooding



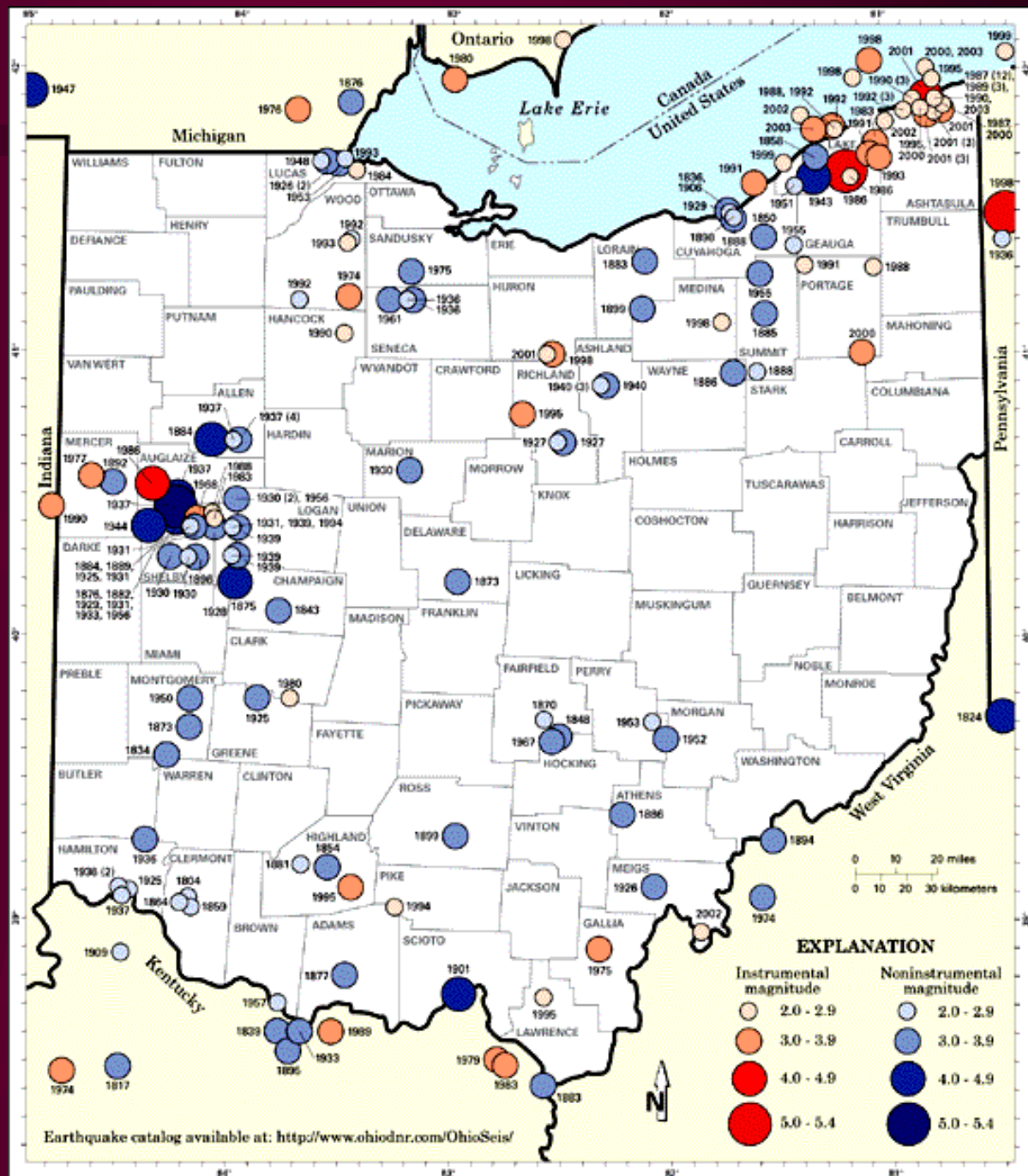
- Precipitation
- Capability of underlying geology to store water:
 - Colluvium
 - Valley-side kames
 - Terrace deposits
 - Infrastructure

Coastal erosion

- 95% of Ohio's Lake Erie shore is eroding.
- Economic losses exceed tens of millions of dollars per year.
- Erosion rates are as high as 110 feet in one year.
- Protection structures often increase erosion rates.
- Manmade shoreline structures trap sand supply; 43% of the shore is now beachless.
- Effective erosion-control efforts require quantification of the geologic processes that cause erosion.
- Nearly 2,500 structures are within 50 feet of destruction.



Ohio Earthquakes



Geologic Mapping

The key to predicting geologic hazards

- Statewide mapping of bedrock and surficial materials (severance-tax funded)
- National Cooperative Geologic Mapping Program (STATEMAP component)
- Central Great Lakes Geologic Mapping Coalition (CGLGMC)
- Subsurface geologic mapping and basement mapping
- Earthquake & fault mapping (OhioSeis)